REMARKS

Objection to the Drawings

A pen-and-ink marked up version and a new clean version of Fig. 11 are hereby submitted to show the changes made to the drawing and overcome the outstanding objection to the drawings.

Rejection - 35 U.S.C. 102(b)

The Examiner has rejected claims 1-4, 13, 14, 16, 21, 57, and 69 under 35 U.S.C. 102(b) as being anticipated by Boomgaard (US. Pat. No. 4,903,006). In reply, Applicant emphasizes that a claim is anticipated if, and only if, each and every element in the claim is found, either expressly or inherently, in the prior art reference(s); and will show that no anticipation exists here for the following reasons.

The examiner proposed that Boomgaard teaches the all of the substantial features of the claimed invention. Applicant emphasizes that the present invention is an active electronic isolator, which serves to isolate the source stage from noise. Boomgaard does not directly isolate the source stage from the load stage or even from other circuitry attached to the lines. Rather, he reduces the noise level on the power lines by controlling the noise remotely at its individual sources. Applicant respectfully set forth the following remarks.

Claim 1

With respect to the claim 1, Boomgaard fails to teach, describe, or suggest the following features:

1. "an active electronic isolator" - The alleged active electronic isolator disclosed by Boomgaard (28) is a passive circuit, not an active one.

The examiner refers to item 28 ("trap" per col. 2, line 56 and "common mode trap" per col. 2, line 54 and col. 3, line56) as "an active electronic isolator". Item 28 is comprised only of capacitors (items 30, 32, and 34) and a transformer (item 35), which are passive components. A transformer can only be an active device if it is allowed to saturate as part of its normal operation. Yet, saturation is specifically forbidden in the Boomgaard application because the inductance presented to the radio frequency signals must be continuously kept high to provide high impedance to ground. Boomgaard even discusses the use of an air gap core to prevent saturation in single-phase applications (col. 3, line 68).

2. "isolator between a source and a load stage" - The alleged active electronic isolator disclosed by Boomgaard (28) is not between the source stage and load stage. Only coupling networks (16 and 24) are between a source stage (14) and a load stage (22).

The "active electronic isolator" (28) allegedly disclosed by Boomgaard is not located between source stage (14) and load stage (22), but between source stage (14) and the source of the electrical noise (26) (Boomgaard Abstract, lines 6-10). With respect to the interconnection between the source stage (14) and load stage (22), trap (28) topologically represents a shunt network to ground. Trap (28) is therefore incapable of being "between" (14) and (22) which requires at least one series network.

3. "configuring means for configuring said path" - The alleged active electronic isolator disclosed by Boomgaard (28) contains a circuit path (12-48) into which noise is directed that is not configurable.

The "active electronic isolator" (28) allegedly disclosed by Boomgaard is a circuit comprised entirely of fixed value components. As such, it contains no "configuring means" for the referenced circuit path (26-48) or anything else within the system (10). Boomgaard states specifically (col. 2, lines 53-55) "The present invention isolates the electrical noise via a

broadband common mode trap 28 which requires no tuning." Boomgaard touts this absence of any means for configuring the trap (28) as a significant benefit compared to the tunable filters he refers to as "impractical" in his Background Section.

4. "said path to appear as an infinite impedance to the output signal from the source stage" - The alleged active electronic isolator disclosed by Boomgaard (28) contains a circuit path (12-48) into which noise is directed that is physically incapable of presenting infinite impedance to the output signal from the source stage (or any other signal). It can only present "high" impedance to a limited class of signals (common mode).

As a trap circuit, the Boomgaard system contains a path into which electrical noise is directed. The examiner identifies the path as (26-48). In actuality, the path into which noise is directed is formed by capacitors (30, 32 and 34) and winding (42) of transformer (35). This path couples power line (12) to ground at node (48). Since capacitors and a transformer winding form said path, the only way for this path "to appear as an infinite impedance to the output signal from the source stage" is for the components forming the path to have infinite Q, an idealization that is a physically unrealizable condition in a purely passive network. At best the impedance will be "high" as Boomgaard describes in (col. 3, line 37), at least with respect to the common mode communications signals present.

Trap (28), including the path, presents high impedance only to common mode signals. Transformer (35) is part of a class of transformers often referred to as a common mode choke. These devices are typically used to reflect common mode signals and keep them away from circuitry where common mode is easily converted to differential noise. Differential signals and differential noise will pass through this type of circuitry as it represents low impedance to these signal types. It should be further noted that the source stage (14) output signal is a differential signal. Therefore, the impedance with respect to the source stage (14) output signal of said path (12-48) is actually low, not high (much less infinite).

An alternative way of looking at the Boomgaard communications system (10) would be to include coupling apparatus 16 and 24 as part of the source stage and load stage respectively. Thus, the source stage output would primarily be a common mode signal and trap 28 including path (12-48) would presents a "high" (but not infinite) impedance to it. However, this view leaves the source and load stages directly connected together with no "electronic isolator" stage between them. Thus, even if viewed this way, the Boomgaard invention would still fail to disclose an "active electronic isolator between a source stage and a load stage."

Therefore, as Boomgaard does not teach these elements of claim 1, Applicant requests that 102 rejection of claim 1 be withdrawn.

Claims 2-4 and 69

Since claim 1 is now allowable, claims 2-4 and 69 are also allowable because they are either dependent on claim 1 or dependent on another claim that depends on claim 1.

Furthermore, with regard to claims 2-4 and 69, Boomgaard does not teach a configuring means comprising a voltage source. With regard to claims 3 and 4, Boomgaard does not disclose a "T-configuration." Further, with regard to claim 4, Boomgaard does not disclose a "controllable voltage source."

Claim 13

With respect to the claim 13, Boomgaard fails to teach, describe, or suggest the following feature:

1. "an active electronic isolator" - The alleged active electronic isolator disclosed by Boomgaard (28) is a passive circuit, not an active one.

2. "isolator between a source and a load stage" - The alleged active electronic isolator disclosed by Boomgaard (28) is not between the source stage and load stage. Only coupling networks (16 and 24) are between a source stage (14) and a load stage (22).

The same explanations for these two features appear in the arguments for claim 1 and apply here as well.

3. "source electrical connection" and "load electrical connection"

The "active electronic isolator" (28) allegedly disclosed by Boomgaard contains no source electrical connection and no load electrical connection. The trap 28 has electrical connections only to the power lines (12), the two power line coupling apparatus (16 and 24) and the source of electrical noise (26).

4. "insertion loss of said electronic isolator is dependent upon the direction of signal and noise transmission through said electronic isolator"

Finally, as described in the "Summary of the Invention" section of the present invention, an electronic isolator provides highly asymmetric/non-reciprocal attenuation of the electrical signals passing between source stage and load stage. An electronic isolator is defined as a device that permits a signal to pass in one direction while providing high isolation to energy in the reverse direction. The examiner states that Boomgaard discloses an electronic isolator that provides this characteristic, whose insertion loss is inherently "dependent on the direction of signal and noise transmission through the electronic isolator." This is simply not the case. The Boomgaard circuitry connecting source and load stages is completely symmetrical and the insertion loss of said circuitry is the same whether coupling signals and noise from the alleged source stage (14) to the alleged load stage (22) or from the alleged load stage (22) to alleged source stage (14). Since his system provides for bi-directional communication (source and load

stage designations are interchangeable) this lack of an asymmetric insertion loss characteristic would be expected.

Even the trap (28) as an isolated circuit does not demonstrate this asymmetric characteristic. As stated before, it provides high insertion loss only to common mode signals. Boomgaard points this out (col. 3 line 33) with respect to the common mode communications signals entering transformer (35) at the dotted ends of the winding. However, he does not point out that common mode signals entering transformer (35) at the non-dotted ends of the windings would also see high impedance and therefore high insertion loss. This results from the fact that the Boomgarrd system has no useful common mode signals on the noise source side of transformer 35.

It must be noted that the noise generated by noise source (26) is actually composed of both common mode and differential mode components. The differential noise results from the asymmetric circuits and component values (in paths to ground) for each of the various phases. The common mode noise should represent the largest portion of the noise that is generated. Transformer (35) then reflects the common mode component keeping it on the right hand side of transformer (35), effectively reducing the noise interfering with the communications signals. The differential noise passes through the transformer and is then substantially directed into path (12-48) due to its low impedance relative to that presented by the power lines (12). The opposite sense current flow of the differential noise through winding 42 compared to that through the other windings (36, 38, and 40) does contributes to lowering the inductance and thereby the insertion loss of transformer (35) as stated (3-20). However, it does not introduce any significant asymmetric insertion loss characteristic. Ignoring the topological differences and relationships that clearly demonstrate that Boomgaard does not anticipate our electronic isolator, the bottom

line is that common mode chokes as such the one disclosed in Boomgaaard, even with added counter-connected windings, are not isolators.

Claim 14, 16, 21, and 57

Since claim 13 is now allowable, claims 14, 16, 21, and 57 are also allowable because they are either dependent on claim 13 or dependent on another claim that depends on claim 13. Furthermore, with regard to claim 14, the alleged active electronic isolator disclosed by Boomgaard (28) does not exhibit insertion loss from the electrical input to the electrical output that is substantially less than the insertion loss from the electrical output to the electrical input and so cannot have disclosed an active electronic isolator that meets claim 14. With regard to claim 16, the alleged active electronic isolator (28) does not include electrical input or electrical output connections and so cannot have disclosed an active electronic isolator that meets claim 16. Finally, with regard to claims 21 and 57, the alleged active electronic isolator (28) does not include any controllable sources and so cannot have disclosed an active electronic isolator that meets claims 21 and 57.

Interview Summary

A telephone interview was conducted on September 15, 2003 between the Examiner Nugyen and applicant Robert McClanahan and his representatives JD Harriman and David Chan based on the draft proposal. The Examiner stated that he would withdraw the current rejection, but additional search would have to be made. During the interview, applicant explained that the claims of the present invention have the limitation of "active electronic isolator" and how it differed from prior art. The Examiner advised applicant to further explain the differences in the formal reply.

Applicant hereby submits a brief discussion of "active electronic isolator." Applicant asserts that the following only provides discussion of what is known in the art and does not constitute new matter.

Discussion of the limitation "active electronic isolator"

The "Electronic Isolator" of the present invention was so named because its basic characteristics and performance mimic that of the classic isolator used in RF and microwave systems. As a result, a clear understanding of the term "Isolator" can be of significant assistance in understanding the uniqueness of the present invention.

It is known in the art that isolators are primarily defined and characterized by their non-reciprocal signal attenuation (or insertion loss) characteristics. The operation of these devices is briefly described in the Background Art section of this disclosure (page 3, paragraphs 1 and 2). The actual name has changed over the years, primarily to reflect the material used in the manufacture of the devices. 40 years ago, isolators were referred to as "ferrite isolators" to highlight the magnetic material. More recently where materials that are not ferrite have been introduced (typically for specialized or the very highest frequency applications) and given the

normal tendency to simplify terminology, the simple term Isolator is typically used. Commonly known isolators are typically made as 3-port circulators with the third port internally terminated with a matched load. No external access is provided to the third port making it a 2-port device and hence an isolator as opposed to a circulator.

Two items basically characterize isolators, their operating frequency band and their power handling capability. Within these limits, the signal attenuation depends entirely on the direction of the signal flow through the isolator. It does not depend on the nature or any specific characteristic of the signal, nor does it depend on the state of any component within the isolator. Signals applied to the input port of the device exit at the output port with little attenuation. Signals applied to the output port are heavily attenuated with a small residual part exiting at the input port.

The asymmetric signal attenuation characteristic of isolators led directly to its primary application and thus to its name, "Isolator". These devices were (are) used primarily on the output of RF amplifiers to pass the amplifier output with little attenuation and prevent reflected signals and noise from being injected into the amplifier output, and adversely affecting amplifier stability and distorting signals. They "isolate" the amplifier from the downstream circuitry, hence the name "isolator".

In the IEEE dictionary, the definition of isolator includes the term passive in its description. **A passive circuit is not necessary to the realization of the performance characteristics of an isolator, but to date, all isolators have been passive circuits and structures, making the inclusion of "passive" in the definition of "isolator" appropriate. Unlike the active implementation of the present invention, in a passive circuit, isolators cannot be "configured" or dynamically adjusted in response to control signals.** As an active implementation of the basic isolator characteristic, the present invention can incorporate many

additional features and capabilities (such as wide bandwidth or dynamic configuration for performance optimization) that do not detract from its basic underlying asymmetric insertion loss characteristic. Thus the name "Electronic Isolator" is highly appropriate for the basic form of a new class of circuits. As mentioned earlier, this limitation of an "active electronic isolator" is in all pending claims and is at least one element that distinguishes the present invention over all prior art that uses traditional isolator with passive elements.

CONCLUSION

The Examiner has rejected claims 1-4, 13, 14, 16, 21, 57, and 69. Applicant has responded to the 35 U.S.C. 102(b) rejection on these claims. Applicant asserts that the present application is in a condition for allowance.

Respectfully submitted,

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Date: September 16, 2003

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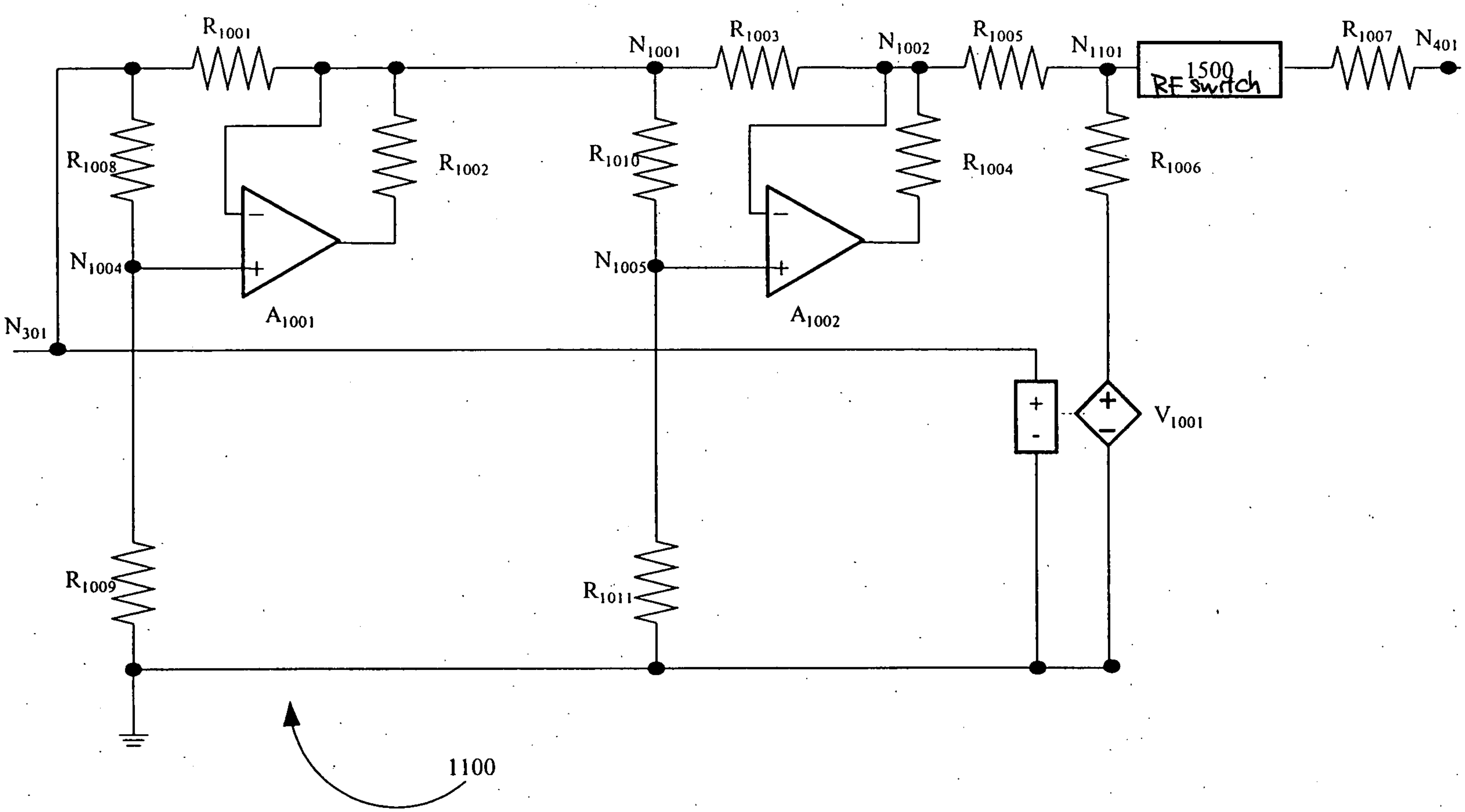
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Figure 11